OBD Communication Protocol

- Allow use of SAE J1939 (on diesels only) or ISO 15765-4 (gas or diesel)
- Must use one or the other for all required OBD communications
  - cannot use ISO 15765-4 protocol with J1939 connector
  - cannot have some modules on a truck use J1939 and others on the same truck use ISO 15765-4
- ISO 15765-4 restricted same as LDV
  - 500k only and max nominal 12 Volts at connector

Standardization Requirements

- Features for diagnosis by a technician
  - Fault Codes
  - Freeze Frames, Test Results
  - Data Stream parameters
- Features for roadside inspection
  - Readiness Status
  - Fault Codes
  - VIN, CVN, CAL ID
  - Data Stream parameters

Standardization Requirements (cont'd)

- Features for OBD enforcement
  - In-use Performance Ratio Tracking
  - Engine run time data
- Features for in-use emission testing and certification
  - Engine run time data
  - NTE control area real time data
  - NTE control area logged data
  - Emission increasing AECD logged data

Standardization Requirements (cont'd)

- For clarity, the proposed regulation lists separate requirements for SAE J1939 vs. ISO 15765-4 vehicles
  - Diagnostic link connector
  - Fault codes
- Separate requirements for diesel vs. gasoline vehicles
  - Data stream parameters
  - Real time and logged NTE control area data

Roadside Inspection Integrity

- OBD system must be able to be used robustly in a roadside inspection
- Identification numbers (VIN, CVN, CAL ID) used to help prevent fraudulent testing
- Three elements used to identify drivers attempting to clear codes without repair
  - Readiness Status
  - Permanent Fault Codes
  - Data stream parameters (“….since codes cleared”)

Roadside Inspection Integrity (cont'd)

- Readiness Status
  - identify if major monitors have run since code clear
  - able to identify failing components not identified by permanent fault codes (due to disablement or multiple failures)
- Permanent fault codes
  - identify if monitor of most recent MIL-on fault has run since code clear
  - can only be erased by the OBD system itself, not by battery disconnect or scan tool
  - able to identify failing component with no readiness status (i.e., non-major monitors) or whose readiness status is "incomplete" (e.g., due to a recent battery disconnect)

OBD Enforcement Testing

- Tracking of in-use performance ratios
  - Used to determine monitor frequency
- Proposal also requires tracking of:
  - total engine run time
  - engine idle time
  - engine run time with PTO active
- Data will be used with in-use performance ratio data to adjust (if necessary) the minimum ratios

In-use Emission Testing and Emission Certification

- For diesels, required to report real time data:
  - NTE control area status (in NTE, outside NTE, in NTE 5% carve-out area, or NTE deficiency active)
- Simplifies task of PEMS or other testing to verify collected data are valid NTE data
- Allows easy verification that engine is operating as designed and certified with respect to carve-out and deficiencies

NTE area real time data

- Engine ECU would need to know:
  - Engine speed/torque map to report in/out of NTE area
    - Already used by engine to calculate and broadcast torque
  - Manufacturer-defined 5% carve-out areas
    - Region would have to be mapped in the ECU
  - NTE deficiency active
    - Most cases, ECU is taking a control action (such as shutting off EGR) in response to measured/sensed/calculated conditions being satisfied
    - Not required to real-time report deficiencies that are not a result of any sensed/measured/ calculated parameter and the ECU takes no action

In-use Emission Testing and Emission Certification (cont'd)

- For diesels, required to track/log:
  - Engine run time: in NTE control area, in carve-out area(s), and with each individual NTE deficiency active
  - Engine run time with each individual emission increasing AECD active
- Both can be used for emission testing (verify collected data were valid)
- Both can be used by certification staff for future model year approvals of 5% carve-outs, NTE deficiencies, and AECDs

What is an emission-increasing AECD?

- From the proposed OBD regulation:
  - "…any approved AECD that is not classified as an NTE deficiency but causes emissions to exceed the NTE emission limits regardless of whether it occurs within or outside of the NTE control area..."
  - Examples could be extended idle strategy or other engine protection strategies that cause emissions to exceed the numerical NTE emission limits even though they may not occur inside the NTE control area